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Human Risk Factors for Severity of Injuries in Urban and Suburban Traffic Accidents in Southern Iran: An Insight from Police Data

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Abstract

Background: Globally, transport injuries persist as the leading preventable cause of adolescent harm.
Objectives: This study aimed to determine the role of human factors in causing traffic accidents in urban and suburban areas of Jahrom, Fars province, Iran.
Materials and Methods: This descriptive study used the recording data of 598 accidents and incidents on urban and suburban roads recorded in the accident registration forms (KAM) of the Police Information and Communication Technology (ICT- FAVA) system in Jahrom in 2020. The obtained data were analyzed by SPSS 20 software using descriptive statistics, chi-square test, and multivariable logistic regression. Simultaneously, population-attributable risks for violations of drivers involved in accidents on urban and suburban roads were determined.
Results: The multivariable logistic regression analysis identified sudden diversion (OR = 11.02, 95% CI: 3.79 - 32.00), inattention to the front (OR = 6.68, 95% CI: 3.27 - 13.61), non-observance of the right of priority (OR = 6.25, 95% CI: 2.80 - 13.98), and inability to control the vehicle (OR = 4.05, 95% CI: 1.81 - 8.90) as risk factors for death or injury in urban roads. Meanwhile, death or injury on suburban roads was associated with failure to yield to the right of way (OR = 2.25, 95% CI: 1.08 - 4.67), inattention to the front (OR = 1.95, 95% CI: 1.08 - 3.51), and inability to control the vehicle (OR = 41.86, 95% CI: 1.001 - 4.63). Among humans factors of accidents on urban and suburban roads, inattention to the front (78.84% vs. 37.73%) and failure to yield to the right of way (62.75% vs. 32.31%) had the greatest population-attributable fraction risk factors of death or injury.
Conclusions: Inattention to the front and non-observance of the right of way by drivers were the first and second ranks in accidents leading to injury and death. It is suggested that the relevant laws and legislations be intensified and enforced more seriously.

Keywords: Risk Scores, Accidents, Islamic Republic of Iran, Traffic

1. Background

Injuries are a significant yet neglected cause of mortality, with millions of injury-related deaths each year reflecting significant disparities by gender, race, and socioeconomic status (1). Globally, injuries also cause substantial disability. In 2019, for all ages, road injuries (ranked 7th) were the leading causes of disability-adjusted life years (DALYs) (2). Road accidents are the most critical cause of injury-related deaths. It takes the lives of 1.2 million people worldwide annually, and 20 to 50 million people are injured or disabled. Low- and middle-income countries represent 84% of the world's population and 53% of vehicles (3). These countries account for 90% of deaths due to traffic accidents, which is twice the number in high-income countries (4).

According to the World Health Organization (WHO), the average death rate from traffic accidents worldwide is 19 per 100,000 population, of which 17.4 are in Europe and 26.4 in the Eastern Mediterranean (5, 6). In Iran, traffic accidents are the third leading cause of death after cardiovascular diseases and cancers. The number of victims of traffic accidents in Iran is reported to be 30 to 39 per 100,000 population (7). Numerous factors are involved in traffic accidents, generally classified into three groups: Vehicle-related, environmental-related, and human factors (8). The human element is the most complex component in the etiology of traffic accidents, as it is the most common and important cause of traffic accidents (9).

Various studies have been conducted to identify risk factors for fatalities in traffic accidents (10-12). According to a study in the US, the role of human factors was esti-

mated at 57%. Also, the part of environment and road factors equaled 34%, whereas 30% was shared between the environment and humans, and 4% depended only on environmental conditions (13). Other studies have reported gender, not wearing a seat belt, age, driving over the speed limit, smoking and alcoholism, driver inattention, and the driver's inability to control the vehicle as human risk factors in the accident (7, 9, 14). Identifying the most likely human risk factors affecting/aggravating the severity of accidents can be considered a basis for effectively preventing traffic accidents. Deciding on the type of interventions and applying population-based prevention strategies requires access to information based on scientific evidence (15).

2. Objectives

This study aimed to determine the role of human factors in causing traffic accidents in both urban and suburban areas of Jahrom, Fars province, and compare them to provide the basic information required for policymakers and decision-makers to help create the necessary interventions in traffic accidents.

3. Materials and Methods

3.1. Study Design

This descriptive study uses secondary data analysis. It is based on census data on 598 traffic accidents and incidents on urban and suburban roads in Jahrom in 2020, recorded in the accident registration forms (KAM) of the Police Information and Communication Technology (ICT-FAVA) system. Inclusion criteria were the traffic accidents that occurred in Jahrom, after which the traffic police were contacted, and their information was recorded in the FAVA system related to traffic. Also, the recorded accidents whose information was incomplete and not at hand were excluded.

In general, the traffic police, after being informed of the car accident, come to the scene to investigate and, according to their legal duty, complete KAM forms. In these forms, the outcome of the traffic accident is recorded in three categories: Fatal, injury, and damage.

The gathered data included general characteristics of the population, such as age, sex, education, driver's license status, seat belt use status, and violations recorded in the traffic police database, including failure to yield to the right of way, driver inattention to the front, inability to control the vehicle, bypassing a forbidden place, opening the car door suddenly, moving in the opposite direction, crossing the banned area, turning incorrectly, not observing the longitudinal distance, not observing the lateral space, moving in reverse gear, and sudden diversion. All the data were extracted from the system and sorted by different geographical areas of Jahrom.

3.2. Statistical Analysis

The obtained data were analyzed by SPSS 20 software using descriptive statistics, chi-square test, and multivariable logistic regression using the backward technique. The dependent variable was the type of accident in two categories: Damage and death or injury. A P-value less than 0.05 was considered statistically significant.

The population-attributable risk was calculated via the following formula (16):

$$\%AR_{pop} = \frac{P_e\,(OR-1)}{1+P_e\,(OR-1)} \times 100$$

Where OR is the odds ratio of the risk factor calculated using multivariable logistic regression analysis, and P_e is the ratio of the population exposed to the risk factor. The 95% confidence intervals for AR were computed (17) via SAS Version 9.1 (SAS Institute, Cary, NC).

3.3. Ethical Consideration

The study protocol was approved by the Research Ethics Committee of Jahrom University of Medical Sciences (IR.JUMS.REC.1399.135).

4. Results

A total of 598 traffic accidents on urban and suburban roads, based on data extracted from police records, resulted in 20 deaths and 356 injuries, and the rest was unharmed. In examining the characteristics of people involved in accidents on urban and suburban roads, men had the highest frequency (Figure 1). For example, 114 (87%) drivers involved in accidents on urban roads that resulted in death or injury were men. The rest were related to female drivers. The age group of 30 - 59 years had the highest frequency of accidents resulting in death or injury (n = 75, 57.3%) and unharmed accidents (n = 102, 65.4%). The highest frequency of deaths or injuries was related to drivers with diploma education. The use of seat belts on urban roads of Jahrom was 58.18% (167 people) (Table 1).

Examining the characteristics of people involved in accidents on suburban roads showed that the high frequencies of deaths or injuries were 230 (93.5%) in men and 174 (70.7%) in 30 to 59 years. The use of seat belts on suburban roads in Jahrom was 22.50% (70 people). In 40.51% (126 people), the status of the use of seat belts was unknown, and 36.97% (115 people) of drivers did not use seat belts (Table 1).

On urban roads, inattention to the front (n = 86, 65.6%), non-observance of the right of way (n = 42, 32.1%), inability to control the vehicle (n = 36, 27.5%), and sudden change of direction (n = 22, 16.8%) was in the first to fourth ranks, respectively, in the proportion of violations leading to death or injury (Table 2). On suburban roads, non-attention to

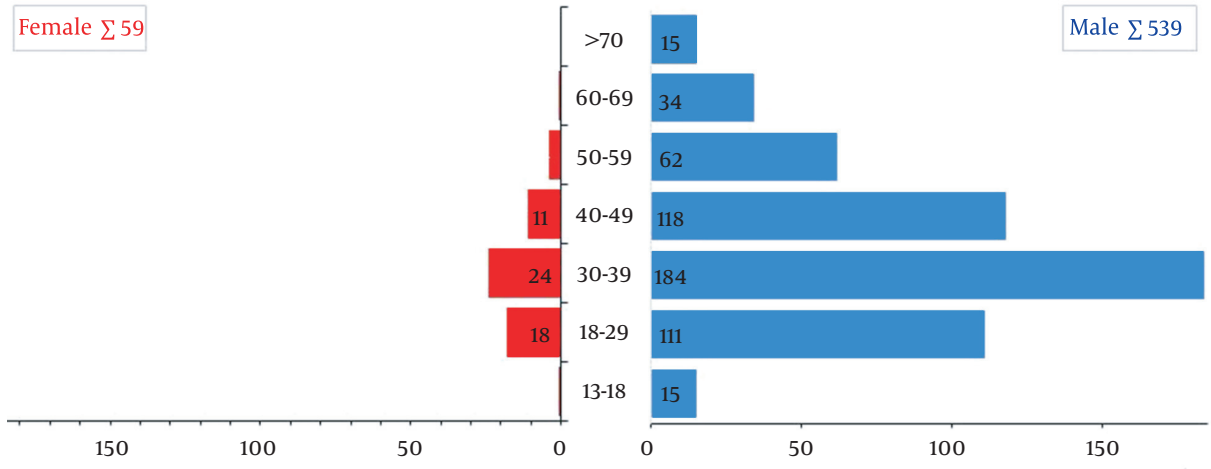

Figure 1. Age-sex pyramid distribution of traffic accidents on urban and suburban roads in Jahrom in 2020

Table 1. Demographic Characteristics of Drivers Involved in Accidents on Urban and Suburban Roads in Jahrom, 2020

Variables	Urban		P-Value [a]	Suburban		P-Value [a]
	Death and Injury, No. (%)	Damage, No. (%)		Death and Injury, No. (%)	Damage, No. (%)	
Age (y)			0.004			0.005
1 - 17	5 (3.8)	0 (0)		5 (2)	0 (0)	
18 - 29	41 (31.3)	37 (23.7)		50 (20.3)	7 (10.8)	
30 - 59	75 (57.3)	102 (65.4)		174(70.7)	52 (80)	
> 60	10 (7.6)	17 (10.9)		17 (6.9)	6 (9.2)	
Gender			0.88			0.73
Male	114 (87)	135 (86.5)		230 (93.5)	60 (92.3)	
Female	17 (13)	21 (13.5)		16 (6.5)	5 (7.7)	
Education			0.002			0.056
High school	22 (16.8)	24 (15.4)		10 (40.1)	0 (0)	
Diploma	49 (37.4)	69 (44.2)		30 (12.2)	3 (4.6)	
University	36 (27.5)	63 (40.4)		4 (1.6)	0 (0)	
Unknown	24 (18.3)	0 (0)		202 (82.1)	62 (95.4)	
Driving license			< 0.0001			< 0.0001
Yes	97 (74)	150 (96.2)		184 (74.8)	60 (92.3)	
No	34 (26)	6 (3.8)		39 (15.9)	1 (1.50)	
Unknown	0 (0)	0 (0)		23 (9.3)	4 (6.2)	
Using a seat belt			< 0.001			< 0.0001
Yes	53 (40.5)	114 (73.1)		68 (27.6)	2 (3.1)	
No	57 (43.5)	42 (26.9)		98 (39.8)	17 (26.2)	
Unknown	21 (16)	0 (0)		80 (32.5)	46 (70.8)	

[a] Chi-square test.

the front (n = 157, 63.8%), non-observance of the right of way (n = 94, 38.2%), non-observance of the longitudinal distance (n = 63, 25.6%), and turning in the forbidden place (n = 45, 18.3%) were ranked first to fourth, respectively, in the proportion of violations leading to death or injury (Table 3).

The result of the univariate analysis showed that the non-observance of the right of priority, inability to control the vehicle, inattention to the front, sudden diversion, and failure to observe the transverse distance were associated with death or injury on urban roads ($P < 0.05$) (Table 2). Meanwhile, failure to yield to the right of way and inattention to the front were associated with death or injury on suburban roads ($P < 0.05$) (Table 3).

According to the results of multivariate logistic regression analysis, death or injury on urban roads was 11.02 times more likely to be associated with sudden diversion (OR = 11.02, 95% CI: 3.79 - 32.00), 6.68 times with inattention to the front (OR = 6.68, 95% CI: 3.27 - 13.61), 6.25 times with non-observance of the right of priority (OR = 6.25, 95% CI: 2.80 - 13.98), and 4.05 times with inability to control the vehicle (OR = 4.05, 95% CI: 1.81 - 8.90) (Table 2). Meanwhile, death or injury on suburban roads was 2.25 times more likely to be associated with non-observance of the right of priority (OR = 2.25, 95% CI: 1.08 - 4.67), 1.95 times with inattention to the front (OR = 1.95, 95% CI: 1.08 - 3.51), and 1.86 times with inability to control the vehicle (OR = 41.86, 95% CI: 1.001 - 4.63) (Table 3).

The population attributable risk for human risk factors of death or injury on urban roads were inattention to the front (PAF: 78.84%, 95% CI: 59.82 - 89.21), failure to yield to the right of way (PAF: 62.75%, 95% CI: 36.62 - 80.64), sudden diversion (PAF: 62.73%, 95% CI: 31.91 - 92.21), and inability to control the vehicle (PAF: 45.61%, 95% CI: 18.21 - 68.47) (Figure 2).

The population attributable risk for human risk factors of death or injury on suburban roads was inattention to the front (PAF: 37.73%, 95% CI: 4.85 - 61.55), failure to yield to the right of way (PAF: 32.31%, 95% CI: 2.96 - 55.53), and inability to control the vehicle (PAF: 10.33%, 95% CI: 0.01 - 32.72) (Figure 2).

5. Discussion

This study showed that most at-fault drivers of traffic accidents were men aged 30 - 39. Also, most of the accidents on suburban roads resulted in injuries and deaths in men, which was consistent with the study of Santamariña-Rubio et al. (18). In a study, Cullen et al. (19) found that young men were more at risk of accidents, and the risk persists (remains) with aging. Men also had higher rates for all types of traffic accidents than women, except for those that resulted in hospitalization. In a study, Regev et al. (20) showed that the risk of a traffic accident was highest among 21- to 29-years-old and gradually decreased with age. Young men are more likely to engage in risky/unsafe driving behaviors than women due to consuming alcohol or drugs. These behaviors may be related to the ideals of hegemonic masculinity that encourage the adoption of such unhealthy behaviors (21). On the other hand, the average annual distance traveled by women drivers was too short compared to men. It can be one of the other reasons that can sometimes lead to poor driving skills and the inability of women to prevent traffic accidents. Despite these reasons, female drivers may be more careful when driving with children.

In this study, the seat belt use on urban and suburban roads was 58.18% and 22.50%, respectively. However, in some traffic incidents, when the police arrived at the scene to investigate the cause of the accident, the driver was taken out of the car by emergency medical services (EMS) or people present at the scene, and the seat belt use status of those drivers was unknown. The highest rate of accidents resulting in injury and death was reported by drivers who did not wear (fasten) their seat belts. Hemayatkhah et al. showed that seat belts in drivers and front passengers of light vehicles on Jahrom's urban roads were 60.9% and 37.3%, respectively (22). Several other studies conducted in Iranian cities also showed the driver seat belt use, including 53% in Kerman (23), 84.6% in Golestan province (24), 58.2% in Sistan and Baluchestan province (25), and 68.1% in Kashan (26).

The seat belt use among drivers in the US was reported at 71% in 2000 (27), 75% in 2002, and 80% in 2004 (28). In Australia, 85% of vehicle drivers wore seat belts in 1994 (29). One of the reasons for the high frequency of traffic accidents leading to injuries and deaths in developing countries is the cultural lag in the use of safety equipment, including seat belts, and the lack of adequate restraining laws.

This study showed that inattention to the front and failure to yield to the right of way were the first and second ranks of human factors leading to injury and death in traffic accidents on urban and suburban roads. Also, the PAF for risk factors of death or injury on urban roads was estimated as follows: 78.84% inattention to the front, 62.75% failure to yield to the right of way, 62.73% sudden diversion, and 45.61% inability to control the vehicle. For risk factors of death or injury on suburban roads, PAF was 37.73% for inattention to the front, 32.31% for failure to yield to the right of way, and 10.33% for inability to control the vehicle.

In other studies, the rankings for the causes of injury or death were somewhat different. Bakhtiyari et al. showed that inattention to the front was the leading cause of death in urban areas of Iran (30). Shiri et al. reported that illegal overtaking and the inability to control the vehicle on both

Table 2. Univariate and Multivariable Logistic Regression Model for Injury or Death Due to Traffic Accidents on Urban Roads in Jahrom, 2020

Variables	Death and Injury, No. (%)	Damage, No. (%)	Crude OR (95% CI)	P-Value [a]	P-Value [Age * Group (Interaction)] [b]	Adjusted OR (95% CI)	P-Value [c]	P-Value [Age * Group (Interaction)] [d]
Non-observance of the right of priority								
Yes	42 (32.1)	36 (23.9)	1.57 (1.001 - 2.65)	0.04	0.020	6.25 (2.80 - 13.98)	< 0.0001	< 0.0001
No	89 (67.9)	120 (76.9)	Ref	NA	NA	Ref	NA	NA
Inability to control the vehicle								
Yes	36 (27.5)	27 (17.3)	1.81 (1.02 - 3.18)	0.03	0.044	4.05 (1.81 - 8.90)	< 0.0001	0.001
No	95 (72.5)	129 (82.7)	Ref	NA	NA	Ref	NA	NA
Inattention to the front								
Yes	86 (65.6)	68 (43.6)	2.47 (1.53 - 3.99)	< 0.0001	< 0.0001	6.68 (3.27 - 13.61)	< 0.0001	< 0.0001
No	45 (34.4)	88 (56.4)	Ref	NA	NA	Ref	NA	NA
Turning in the forbidden place								
Yes	4 (3.1)	3 (1.9)	1.60 (0.35 - 7.03)	0.54	0.113	NA	NA	NA
No	127 (96.9)	153 (98.1)	Ref	NA	NA	NA	NA	NA
Sudden diversion								
Yes	22 (16.8)	9 (5.8)	3.27 (1.46 - 7.44)	0.004	0.010	11.02 (3.79 - 32.00)	< 0.0001	NA
No	109 (83.2)	147 (94.2)	Ref	NA	NA	Ref	NA	NA
Rear gear								
Yes	12 (9.2)	7 (4.5)	2.14 (0.82 - 5.62)	0.12	0.081	NA	NA	NA
No	119 (90.8)	149 (95.5)	Ref	NA	NA	NA	NA	NA
The sudden opening of the door								
Yes	4 (3.1)	2 (1.3)	2.42 (0.43 - 13.45)	0.31	0.135	NA	NA	NA
No	127 (96.9)	154 (98.7)	Ref	NA	NA	NA	NA	NA
Failure to observe the transverse distance								
Yes	22 (16.8)	6 (3.8)	5.04 (1.97 - 12.83)	0.001	0.008	NA	NA	0.082
No	109 (83.2)	150 (96.2)	Ref	NA	NA	NA	NA	NA
Failure to observe the longitudinal distance								
Yes	6 (4.6)	3 (1.9)	2.44 (0.6 - 9.98)	0.31	0.228	NA	NA	NA
No	125 (95.4)	153 (98.1)	Ref	NA	NA	NA	NA	NA
Move in the opposite direction								
Yes	3 (2.3)	2 (1.3)	1.80 (1.90 - 10.96)	0.52	0.135	NA	NA	NA
No	128 (97.7)	154 (98.7)	Ref	NA	NA	NA	NA	NA
Forbidden to cross the place								
Yes	3 (2.3)	3 (1.9)	1.19 (0.23 - 6.02)	0.82	0.147	NA	NA	NA
No	128 (97.7)	153 (98.1)	Ref	NA	NA	NA	NA	NA
Circulation incorrectly								
Yes	6 (4.6)	2 (1.3)	3.69 (0.83 - 1 - 8.32)	0.11	0.085	NA	NA	NA
No	125 (95.4)	154 (98.7)	Ref	NA	NA	NA	NA	NA

Abbreviations: OR, odds ratio; NA, not applicable; Ref, reference group.
[a] Univariable logistic regression.
[b] Age * group effect (interaction) in univariable logistic regression.
[c] Backward method in multivariable logistic regression.
[d] Age * group effect (interaction) in multivariable logistic regression.

the streets and highway axes of Tehran were the highest violations leading to injury or death, in sequence (31).

In the study by Shadmani et al., illegal overtaking was an essential factor in injury or death outcomes (32). Bakhtiyari et al. showed that alcohol consumption significantly increases the chances of injury and fatal accidents in urban areas (33); furthermore, the predominant factor in accidents is driver negligence, which can be due to various reasons such as distraction, monotonous driving, and excessive attention.

The difference between the distribution of causes or factors influencing the occurrence of an accident depends

Table 3. Univariate and Multivariable Logistic Regression Model for Injury or Death Due to Traffic Accidents on Suburban Roads in Jahrom, 2020

Variables	Death and Injury, No. (%)	Damage, No. (%)	Crude OR (95% CI)	P-Value [a]	P-Value [Age * Group (Interaction)] [b]	Adjusted OR (95% CI)	P-Value [c]	P-Value [Age * Group (Interaction)] [d]
Non-observance of the right of priority								
Yes	94 (38.2)	15 (23.1)	2.06 (1.09 - 3.87)	0.049	0.001	2.25 (1.08 - 4.67)	0.029	0.368
No	152 (61.8)	50 (76.9)	Ref	NA	NA	Ref	NA	NA
Inability to control the vehicle								
Yes	33 (13.4)	7 (10.8)	1.28 (0.98 - 3.05)	0.075	0.008	1.86 (1.001 - 4.63)	0.04	0.016
No	213 (86.6)	58 (89.2)	Ref	NA	NA	Ref	NA	NA
Inattention to the front								
Yes	157 (63.8)	31 (47.7)	1.93 (1.11 - 3.36)	0.019	0.001	1.95 (1.08 - 3.51)	0.025	0.974
No	89 (36.2)	34 (52.3)	Ref	NA	NA	Ref	NA	NA
Turning in the forbidden place								
Yes	45 (18.3)	11 (16.9)	1.09 (0.53 - 2.26)	0.79	0.044	NA	NA	NA
No	201 (81.7)	54 (83.1)	Ref	NA	NA	NA	NA	NA
Sudden diversion								
Yes	41 (16.7)	9 (13.8)	1.24 (0.57 - 2.71)	0.58	0.030	NA	NA	NA
No	205 (83.3)	56 (86.2)	Ref	NA	NA	NA	NA	NA
Rear gear								
Yes	6 (2.4)	1 (1.5)	1.60 (0.18 - 13.53)	0.66	0.012	NA	NA	NA
No	240 (97.6)	64 (98.5)	Ref	NA	NA	NA	NA	NA
The sudden opening of the door								
Yes	2 (1.3)	0 (0)	NA	NA	NA	NA	NA	NA
No	154 (98.7)	65 (100)	NA	NA	NA	NA	NA	NA
Failure to observe the transverse distance								
Yes	21 (8.5)	225 (91.5)	5.97 (0.78 - 45.26)	0.084	0.014	NA	NA	NA
No	1(1.5)	64(95.8)	Ref	NA	NA	NA	NA	NA
Failure to observe the longitudinal distance								
Yes	63 (25.6)	11 (16.9)	1.69 (0.83 - 3.43)	0.14	0.065	NA	NA	NA
No	183 (74.4)	54 (83.1)	Ref	NA	NA	NA	NA	NA
Move in the opposite direction								
Yes	2 (0.8)	0 (0)	NA	NA	0.044	NA	NA	NA
No	244 (99.2)	65 (100)	NA	NA	NA	NA	NA	NA
Forbidden to cross the place								
Yes	3 (1.9)	0 (0)	1.02 (0.57 - 3.49)	0.91	0.010	NA	NA	NA
No	153 (98.1)	65 (100)	Ref	NA	NA	NA	NA	NA
Circulation incorrectly								
Yes	3 (1.3)	0 (0)	1.001 (0.23 - 7.48)	0.99	0.013	NA	NA	NA
No	154 (98.7)	65 (100)	Ref	NA	NA	NA	NA	NA

Abbreviations: OR, odds ratio; NA, not applicable; Ref, reference group.
[a] Univariable logistic regression.
[b] Age * group effect (interaction) in univariable logistic regression.
[c] Backward method in multivariable logistic regression.
[d] Age * group effect (interaction) in multivariable logistic regression.

on age, gender, familiarity with the road, the tendency to dangerous behaviors, and driving habits (34). In addition, personality traits can determine driving behavior. Different drivers have different driving styles (35). It can be said that a set of causes with varying impact intensities at other times and places are involved in traffic accidents. The division of traffic accidents according to the age and gender of drivers, cultural level and literacy of people, different seasons of the year, and the quality of roads and cars are the reasons for these differences.

One of the strengths of this study is the use of a large sample size, considering several important risk factors for traffic accidents, and using data recorded by the traffic police collected with reliable tools. Given that there are few similar studies in this field, the findings of this study are essential for policymakers and the traffic police in deciding on traffic accidents.

One of the limitations of this study is that the data in the country's mechanized information and guidance system (FAVA) was limited to accidents at the scene of the accident and did not include deaths that occurred among the injured after 30 days of the accident. Also, the data of the

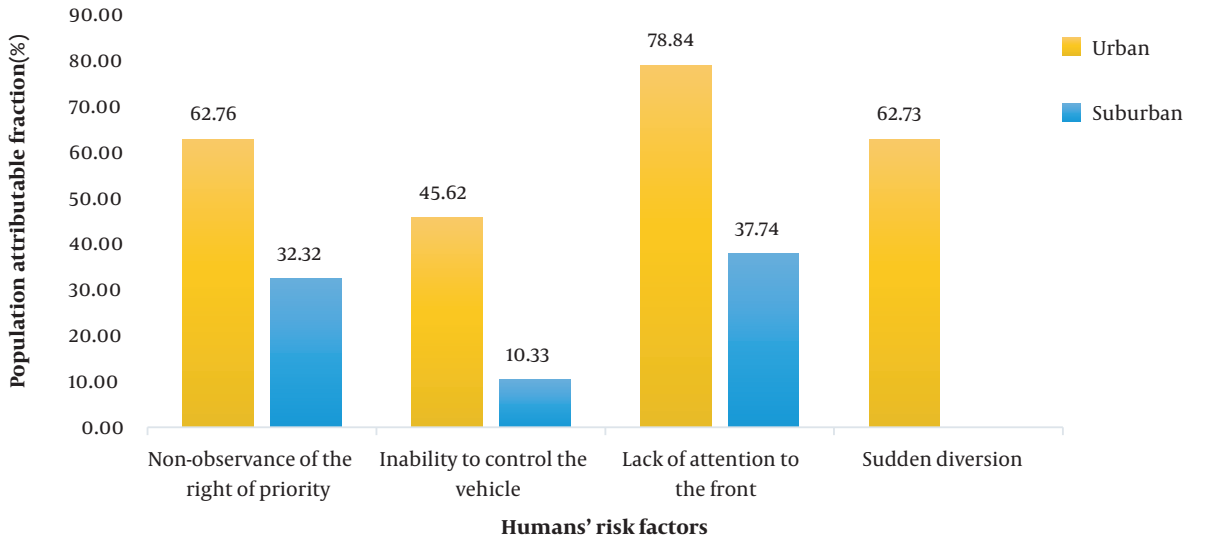

Figure 2. Population attributable fraction for injury or death due to traffic accidents on urban and suburban roads due to human risk factors.

incidents without injuries or the drivers reluctant to report to the police were omitted. Therefore, this study may not include all cases of accidents that occurred during the study period. There is also the possibility of errors in registering information by traffic police staff. It is necessary to consider these details in generalizing the study results.

5.1. Conclusions

The findings of this study showed that, in general, the number of traffic accidents was higher in younger and middle-aged men than in other age and sex groups. Also, not wearing a seat belt in accidents led to more injuries or deaths. The causes of traffic accidents on urban and suburban roads were very similar; inattention to the front and failure to yield to the right of way took the first and second ranks of the events leading to injury and death, respectively. It is suggested to plan effective interventions for cultural reforms according to drivers' individual and social characteristics and to improve deterrence laws to reduce traffic accidents.

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Footnotes

Authors' Contribution: VR and MA conceived and designed the study. NSH and KR were responsible for the literature search and screening. MA and VR were responsible for data collection. VR participated in the statistical analysis. NSH and KR contributed to data interpretation. VR and NSH drafted the manuscript. KR critically revised the manuscript. All authors read and approved the final manuscript.

Conflict of Interests: The authors declare no competing interests.

Data Reproducibility: The data supporting this study's findings are available from the corresponding author (VR), upon reasonable request.

Ethical Approval: The study protocol was consistent with the ethical principles of the Helsinki Declaration. The Research Ethics Committee of Jahrom University of Medical Sciences approved it with the ethical ID, IR.JUMS.REC.1399.135 (link: ethics.research.ac.ir/ProposalCertificateEn.php?id=180906).

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References

1. Dandona R, Kumar GA, Gururaj G; et al. Correction: Global injury morbidity and mortality from 1990 to 2017: results from the Global Burden of Disease Study 2017. *Inj Prev*. 2020;**26**(Supp

1). i165. [PubMed ID: 32989006]. [PubMed Central ID: PMC7571345]. https://doi.org/10.1136/injuryprev-2019-043494corr1.
2. G. B. D. Diseases, Injuries C. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. 2020;**396**(10258):1204–22. [PubMed ID: 33069326]. [PubMed Central ID: PMC7567026]. https://doi.org/10.1016/S0140-6736(20)30925-9.
3. India State-Level Disease Burden Initiative Road Injury Collaborators. Mortality due to road injuries in the states of India: the Global Burden of Disease Study 1990-2017. *Lancet Public Health*. 2020;**5**(2):e86–98. [PubMed ID: 31879251]. [PubMed Central ID: PMC7098470]. https://doi.org/10.1016/S2468-2667(19)30246-4.
4. World Health Organization. *Global status report on road safety 2015*. Geneva, Switzerland: World Health Organization; 2015.
5. World Health Organization. *Road safety in the Eastern Mediterranean Region: facts from the global status report on road safety 2018*. Geneva, Switzerland: World Health Organization; 2020.
6. Larson K, Bavinger R, Henning K. The Bloomberg initiative for global road safety 2015-2019: Addressing road traffic fatalities in low-and middle-income countries. *Journal of the Australasian College of Road Safety*. 2016;**27**(3):41–3.
7. Soori H, Khorasani-Zavareh D. Road traffic injuries measures in the Eastern Mediterranean Region: findings from the Global Status Report on Road Safety - 2015. *J Inj Violence Res*. 2019;**11**(2):149–58. [PubMed ID: 31101799]. [PubMed Central ID: PMC6646828]. https://doi.org/10.5249/jivr.v11i2.1122.
8. de Vries J, de Koster R, Rijsdijk S, Roy D. Determinants of safe and productive truck driving: Empirical evidence from long-haul cargo transport. *Transp Res E: Logist Transp Rev*. 2017;**97**:113–31. https://doi.org/10.1016/j.tre.2016.11.003.
9. Soori H, Yousefinezhadi T. [Comparison and Analysis of Road Traffic Injuries in Iran and the Eastern Mediterranean Region: Findings from the Global Status Report on Road Safety-2018]. *Iran J Epidemiol*. 2020;**16**(3):192–201. Persian.
10. Chang FR, Huang HL, Schwebel DC, Chan AHS, Hu GQ. Global road traffic injury statistics: Challenges, mechanisms and solutions. *Chin J Traumatol*. 2020;**23**(4):216–8. [PubMed ID: 32680705]. [PubMed Central ID: PMC7451583]. https://doi.org/10.1016/j.cjtee.2020.06.001.
11. Azami-Aghdash S, Abolghasem Gorji H, Derakhshani N, Sadeghi-Bazargani H. Barriers to and Facilitators of Road Traffic Injuries Prevention in Iran; A Qualitative Study. *Bull Emerg Trauma*. 2019;**7**(4):390–8. [PubMed ID: 31858002]. [PubMed Central ID: PMC6911722]. https://doi.org/10.29252/beat-070408.
12. Rahmanian V, Rahmanian N, Zahedi R, Mansoorian E, Khoubfekr H. Risk factors of mortality following road accident in Southern Iran. *Trauma Mon*. 2021;**26**(4):199–205.
13. Peden M, Scurfield R, Sleet D, Mohan D, Hyder AA, Jarawan E, et al. *World report on road traffic injury prevention*. Geneva, Switzerland: World Health Organization; 2004.
14. Khosravi Shadmani F, Soori H, Karmi M, Zayeri F, Mehmandar MR. [Estimating of Population Attributable Fraction of Unauthorized Speeding and Overtaking on Rural Roads of Iran]. *Iran J Epidemiology*. 2013;**8**(4):9–14. Persian.
15. Ruckinger S, von Kries R, Toschke AM. An illustration of and programs estimating attributable fractions in large scale surveys considering multiple risk factors. *BMC Med Res Methodol*. 2009;**9**:7. [PubMed ID: 19166593]. [PubMed Central ID: PMC2636839]. https://doi.org/10.1186/1471-2288-9-7.
16. Szklo M, Nieto FJ. *Epidemiology: beyond the basics*. Jones & Bartlett Publishers: Massachusetts, USA; 2014.
17. Graubard BI, Fears TR. Standard errors for attributable risk for simple and complex sample designs. *Biometrics*. 2005;**61**(3):847–55. [PubMed ID: 16135037]. https://doi.org/10.1111/j.1541-0420.2005.00355.x.
18. Santamarina-Rubio E, Perez K, Olabarria M, Novoa AM. Gender differences in road traffic injury rate using time travelled as a measure of exposure. *Accid Anal Prev*. 2014;**65**:1–7. [PubMed ID: 24384384]. https://doi.org/10.1016/j.aap.2013.11.015.
19. Cullen P, Moller H, Woodward M, Senserrick T, Boufous S, Rogers K, et al. Are there sex differences in crash and crash-related injury between men and women? A 13-year cohort study of young drivers in Australia. *SSM Popul Health*. 2021;**14**:100816. [PubMed ID: 34041353]. [PubMed Central ID: PMC8141461]. https://doi.org/10.1016/j.ssmph.2021.100816.
20. Regev S, Rolison JJ, Moutari S. Crash risk by driver age, gender, and time of day using a new exposure methodology. *J Safety Res*. 2018;**66**:131–40. [PubMed ID: 30121099]. https://doi.org/10.1016/j.jsr.2018.07.002.
21. Ana M, Carme B, Lucía A. *5a monografía. Sociedad Española de Epidemiología. Investigación sobre género y salud*. Catalonia, Spain: Impremta DITIFET; 2007. Spanish.
22. Hemayatkhah M, Rahmanian V, Rahmanian K, Jahromi AS, Madani A. Safety Belt Use and its Related Factors among Drivers and Occupants of Light Motor Vehicles in Southern Iran: Observation Results. *J Res Med Dent Sci*. 2018;**6**(2):384–90. https://doi.org/10.5455/jrmds.20186259.
23. Borghebani R, Dehghani SL, Khanjani N. [Safety belt use and its related factors: a study from Kerman, Iran]. *Journal of the Iranian Institute for Health Sciences Research*. 2013;**12**(2):159–65. Persian.
24. Veghari G, Sedaghat M, Maghsodlo S, Banihashem S, Moharloei P, Angizeh A, et al. The Trend of Seat Belt Use among Drivers in the North of Iran, 2007-2010: An Epidemiologic Study. *World Appl Sci J*. 2012;**17**(10):1365–9.
25. Mohammadi M, Ansari Moghaddam A, Rad M, Hashemi Habybabady R, Tabasi MA. Seatbelt Use and Related Factors Among Drivers Involved in Road Crashes in Southeast Iran. *Health Scope*. 2015;**4**(4). e30782. https://doi.org/10.17795/jhealthscope-30782.
26. Mohammadzadeh M, Paravar M, Mirzadeh AS, Mohammadzadeh J, Mahdian S. Seat Belt Usage in Injured Car Occupants: Injury Patterns, Severity and Outcome After Two Main Car Accident Mechanisms in Kashan, Iran, 2012. *Arch Trauma Res*. 2015;**4**(1). e22203. https://doi.org/10.5812/atr.22203.
27. Dinh-Zarr TB, Sleet DA, Shults RA, Zaza S, Elder RW, Nichols JL, et al. Reviews of evidence regarding interventions to increase the use of safety belts. *Am J Prev Med*. 2001;**21**(4 Suppl):48–65. [PubMed ID: 11691561]. https://doi.org/10.1016/s0749-3797(01)00378-6.
28. Chaudhary NK, Preusser DF. Connecticut nighttime safety belt use. *J Safety Res*. 2006;**37**(4):353–8. [PubMed ID: 16989863]. https://doi.org/10.1016/j.jsr.2006.05.005.
29. Routley V, Ozanne-Smith J, Yu M, Wang J, Wu M, Zhang J, et al. Focus on seat belt use in China. *Traffic Inj Prev*. 2010;**11**(6):578–86. [PubMed ID: 21128187]. https://doi.org/10.1080/15389588.2010.525157.
30. Bakhtiyari M, Mehmandar MR, Mirbagheri B, Hariri GR, Delpisheh A, Soori H. An epidemiological survey on road traffic crashes in Iran: application of the two logistic regression models. *Int J Inj Contr Saf Promot*. 2014;**21**(2):103–9. [PubMed ID: 23356677]. https://doi.org/10.1080/17457300.2012.762027.
31. Shiri P, Soori H, Razzaghi A. [Estimation of Annual Population Attributable Fraction of the Most Important Human Risk Factors for Road Traffic Injuries (RTIs) on Highways and Streets of the Great Tehran]. *Iran J Epidemiology*. 2018;**14**(3):216–24. Persian.
32. Shadmani FK, Soori H, Mansori K, Karami M, Ayubi E, Khazaei S. Estimation of the population attributable fraction of road-related injuries due to speeding and passing in Iran. *Epidemiol Health*. 2016;**38**. e2016038. [PubMed ID: 27608807]. [PubMed Central ID: PMC5114436]. https://doi.org/10.4178/epih.e2016038.
33. Bakhtiyari M, Soori H, Ainy E, Salehi M. [The survey of the role of humans' risk factors in the severity of road traffic injuries on urban and rural roads]. *Journal of Safety Promotion and Injury Prevention*. 2014;**2**(1):1–8. Persian.
34. Bucsuházy K, Matuchová E, Zůvala R, Moravcová P, Kostíková M, Mikulec R. Human factors contributing to the road traffic accident occurrence. *Transp Res Proc*. 2020;**45**:555–61. https://doi.org/10.1016/j.trpro.2020.03.057.
35. Chen S, Fang C, Tien C. Driving behaviour modelling system based on graph construction. *Transp Res Part C Emerg Technol*. 2013;**26**:314–30. https://doi.org/10.1016/j.trc.2012.10.004.